FACILITY DESIGN CHECKLIST

Building: _____ Rooms: _____

Date: _____ Prepared By: _____

Project: _____

Work Order Number: _____

GENERAL CONSIDERATIONS

___ 1. This checklist is to accompany the completed Work Order

___ 2. Provision of complete specifications for all equipment is crucial. Complete Attachment A entitled EXISTING EQUIPMENT LIST and provide catalog cuts/specifications sheets for all equipment to be procured. _____

___ 3. Consider those tasks, which need to be kept away from the flow of traffic. Provide for them in areas away from doorways. This is especially true of hood locations. See Attachment B for guidance. _____

___ 4. The ideal space between facing laboratory benches is 60". Aisle ways may not be less than 28" in width per requirements. _____

___ 5. All space should be designed with handicap and safety guidelines in place. Do any of the occupying staff have specialized needs? _____

___ 6. Administrative, entryways, corridors and toilets should be designed with handicap guidelines in place. Do any of the occupying staff have specialized _____

___ 7. Is there sufficient provision for transporting heavy or large equipment to the area? Is the elevator large enough for all equipment? _____

___ 8. Is any equipment in a weight category, which may exceed elevator lift capacity or require additional floor support? _____

___ 9. Flammables are stored in flammable storage cabinets as long as a total of less than 60 gallons is kept. Flammable storage equaling or exceeding 60 gallons requires a flammable storage room or building with an appropriate fire extinguishing system, dikes, fire rated doors and explosion-proof fixtures. Up to three 60-gallon cabinets allowed in laboratories. _____

___ 10. Adequate systems must be in place to autoclave biological waste. Some buildings have available an autoclave service for low hazard wastes. Specific guidance may be obtained from the Biological Safety Officer at extension 1904. BSL-3 laboratories are covered elsewhere in this checklist. _____

___ 11. Both safety showers and eyewash stations may be provided in laboratories. Is there a particular area where close proximity to either of these may be required (i.e. chemical fume hoods)? _____

___ 12. Both biological safety cabinets and chemical fume hoods may require up to six months to specify, order, deliver and install. This time must be programmed into the planning process. _____

___ 13. Suspended ceilings are preferred in all but BSL-3 laboratories. Are there any laboratory areas in which suspended ceilings may not be appropriate? (Consider the material of ceiling tile _____

___ 14. Are any special security measures required (e.g. Cardkey, punch locks)? NOTE THAT RADIOACTIVE MATERIALS AND ANIMALS MUST BE SECURE FROM UNAUTHORIZED REMOVAL AT ALL TIMES.

___ 15. Administrative areas – How many people will occupy and is there any high heat generating equipment planned, i.e. servers? _____

___ 16. Sprinkler system must be installed in all buildings over 2000 square feet. Is there any water sensitive equipment or records in the building? Provide mechanical space for sprinkler piping requirements or Inergen tank storage. _____

___ 17. Equipment rooms for lab equipment (freezers, centrifuges, etc.) are highly recommended. Consider equipment/storage room combination for administrative areas (copier, server, supply storage, high volume printers). _____

___ 18. Any requirements for raised floor construction? _____

LABORATORY DESIGN

This is the area in which the researcher is most interested and most instrumental. Take sufficient time to think through each question so that the best possible layout can be designed. Laboratory design will comply with NIH design criteria and policy.

___ 1. Cabinets are kept in stock at NCI-FCRDC. These are standard, heavy-gauge metal, floor-mounted casework. Position these cabinets in the laboratory space in their desired locations. Pay attention to the mix of cabinets with drawers and those with doors. NOTE: CABINETS THAT ARE NOT LISTED IN THE NCI-FCRDC SHOP STOCK CATALOG MAY TAKE UP TO SIX MONTHS TO PROCURE.

___ 2. The counter tops are routinely fabricated with a Formica laminate over a plywood base. Is there a requirement for other counter top compositions?

A. Epoxy Resin_____

B. Stainless Steel._____

NOTE: NONSTANDARD COUNTER TOPS WILL TAKE ADDITIONAL TIME TO PROCURE AND INCREASE THE COST OF THE RENOVATION.

___ 3. Do any of the cabinets require locks? Consider security of personal belongings and requirements to secure needles, syringes and controlled substances..._____

___ 4. Include knee space in all areas where laboratory work will be done while sitting. Consider ergonomics in general (OHS staff can provide guidance). _____

___ 5. Is there a requirement for any of the cabinet space to be vented? This may be necessary for storage of highly volatile substances._____

___ 6. Should the unused wall areas have either wall-hung cabinets or adjustable shelving?_____

___ 7. Are any special floor/ceiling/wall coverings required? _____

___ 8. Should laboratory doors have windows (recommended)? Fire Codes limit these windows to 100 square inches._____

___ 9. Check to verify that all doors are wide enough to allow passage of equipment. Minimum door width is 42", consider 36" active door with passive panel of 12" or more.

___ 10. Is there a requirement for offices? Are windows required in the office doors?_____

___ 11. Will radioisotopes, chemicals, or hazardous biologicals be used? The waste must be held in a secure location for pick up.

Where will the following be stored:

A. Radioactive waste?_____

B. Chemical waste?_____

C. Biological waste?_____

___ 12. Will support from Central Glassware be required? Where will the glassware be stored?_____

MECHANICAL CONSIDERATIONS

___ 1. Do all of the laboratories require water? Hot and cold?_____

___ 2. Does any equipment require a redundant system? _____

___ 3. Any temperature or humidity requirements? Independent control? _____

___ 4. Is reverse osmosis (or distilled) water required?_____

___ 5. Does the endpoint require additional polishing?_____

A. ASTM Standard?_____

B. Cap Standard?_____

C. Who to provide equipment?_____

___ 6. Is there a requirement for clean steam humidification? _____

___ 7. Is there a requirement for cup sinks on the counter tops? Aspirators?_____

___ 8. Can the drain lines for the sinks be iron, or should they be plastic or glass for an acid waste system?_____

___ 9. What size should the sinks be?_____

___ 10. Will any chemicals be used which would corrode stainless steel sinks?_____

___ 11. Does any equipment require a floor drain?_____

Note: Floor drains must meet Ft. Detrick Non-Domestic Waste Water Control Policy.

___ 12. Is any equipment water cooled? Is a chilled water supply required?_____

Consider the temperature of chilled water.

___ 13. Is HVAC on BAS system? _____

___ 14. Does any equipment require ventilation/exhaust (vacuum pumps, special purpose hoods)?_____

___ 15. HVAC fail safe mode? _____

___ 16. Is Lab to be positive or negative to surrounding area? _____

___ 17. Other laboratory utility requirements/locations:

Natural gas (propane)_____
Compressed air_____
Vacuum_____
Gaseous nitrogen_____
Carbon dioxide_____
Steam_____
Liquid nitrogen_____
Other_____

___ 18. Are there any special air filtration requirements supply/exhaust? _____

___ 19. What utilities are to be at biological safety cabinets (gas strongly discouraged) or chemical fume hoods?_____
_____

___ 20. Is an autoclave to be installed? Who will provide?_____

A. Quality steam required (filtered or clean steam)_____
B. Chamber dimensions: _____

___ 21. Are cage & rack washers to be installed?_____

A. Chamber dimensions_____
B. Number of doors and type_____

___ 22. Bio waste kill system required?_____

A. Special door interlocks?_____
B. Recorder required?_____
C. Water ejector/booster pumps?_____
D. Contaminated drain/vent? _____

___ 23. SEPP approved Hoods:

A. Hood Type
Biological Safety Cabinet:
Class I_____
Class II_____
Type A_____
Type B_____
Class II _____
Chemical Fume
Class I _____
Class II (std.) _____
Class III_____
Neocropsy or special purpose hoods

B. Put all hoods on alarm.
C. Interlock all hoods with exhaust fans.
D. Exhaust fans shall fail open for chimney affect.

ELECTRICAL CONSIDERATIONS

___ 1. List all equipment to be installed in laboratories and offices on Attachment A. Include voltage, amperage, and type (configuration) of receptacle. Also identify those items requiring connection to the scientific alarm system. Items left blank will prompt the Engineering Department to research the required information.

___ 2. How many 110V outlets are required on the bench tops? _____
Any special power requirements at lab benches? _____

___ 3. Is emergency power required? _____

___ 4. Any special security requirements? _____

___ 5. Are any special alarm systems required, i.e. oxygen deficiency? _____

___ 6. Is any equipment or process manipulation sensitive to:

A. Vibration?_____
B. Electromagnetic interference?_____
C. Lighting (levels)?_____
D. Power line disturbances? _____

___ 7. Are uninterruptible power or line conditioning required for any equipment? Identify._____
___ 8. Are there any special lighting control requirements?
A. Dimming_____
B. Console control_____
C. Separate switching?_____
D. Light levels?_____

TELECOMMUNICATIONS

___ 1. Identify locations of telephone, fax, and modem jacks. _____
___ 2. Is a LAN hub is required, where will it be located and make provisions for all connections and terminations.
_____
___ 3. Identify if desk or wall phones are required. _____
___ 4. Is an intercom or paging system required? _____

SPECIAL FACILITIES

Walk In Controlled Environment Room

___ 1. What temperature (range) must be maintained?_____
___ 2. How much space is required (sq.ft., height)?_____
___ 3. Will staff work in this room?_____
___ 4. Is filtered light required to protect sensitive materials_____
___ 5. How many electric receptacles are required?
A. 110V_____
B.220V_____
___ 6. Is a sink required? What utilities required at sink?_____
A. Cold water_____
B. Hot water_____
C. RO water_____
___ 7. Are any other utilities required?_____
___ 8. Is shelving required_____
___ 9. Is a framework required for column chromatography?_____
___ 10. What are temperature alarm parameters? _____

Dark Room

___ 1. Is a sink required?_____
A. Kreonite?_____
B. Stainless steel?_____
___ 2. Is a mixing valve required?_____
___ 3. Will a developing tank be installed?_____
___ 4. Will an automatic processing system be used (silver recovery system required)? _____
___ 5. Lighting Requirements:
A. Safe light?_____
B. Incandescent light?_____
C. Fluorescent light?_____
D. Switching arrangement? _____
___ 6. What paint color is required (flat black)?_____
___ 7. Is a revolving dark room door required?_____
___ 8. Will photographic chemicals be stored in the dark room?_____
Where?_____
___ 9. Will a film hanger be required?_____
___ 10. Is space and electrical power required for a transilluminator?_____

BSL-3 Laboratories

BSL-3 laboratories are subject to design criteria described in the most recent edition of the DHHS publication entitled Biosafety in Microbiological and Biomedical Laboratories. Technical requirements are quite stringent, therefore, SEPP must be intimately involved with the design of any such facility to assure compliance with existing regulations and guidelines. All waste is autoclaved by laboratory personnel. The custodial work performed in other laboratories by the service workers is also done by laboratory personnel.

The following elements must be incorporated into the BSL-3 laboratory design.

___ 1. An airlock which is under negative pressure relative to the clean side and positive pressure relative to the BSL-3 laboratory. Pressurization monitors.
___ 2. Secure access, generally provided by combination punch lock
___ 3. Should Hood alarms and interlocks be provided?
___ 4. Double door autoclave which passes through the wall required?
___ 5. Will redundant HVAC systems be required?
___ 6. Is sink for hand washing near exit required?
A. Hands free operated faucet?
___ 7. All penetrations must be sealed.
___ 8. BSL-3 laboratory must be certified by SEPP prior to use.
___ 9. Vacuum lines are protected with HEPA filters.

The following elements are optional in BSL-3 designs:

___ 1. Shower facilities.
___ 2. Pass-thru boxes.
___ 3. Storage for cleaning supplies.
___ 4. Is a door interlock system needed on ante room?

Animal Facilities

Animal facilities are designed in accordance with the most recent edition of the NIH Guide for the Care and Use of Laboratory Animals.

___ 1. How will security be maintained?
___ 2. Will animals be housed in isolators?
___ 3. Will a two corridor (clean/dirty) system be used?
___ 4. Shower in? Shower out?
___ 5. What will be the composition of room surfaces?
A. Floors
B. Walls
C. Ceiling
___ 6. Are floor drains other than cagewash rooms required?
___ 7. Will automatic watering be used?
___ 8. Are waterproof receptacles required?
___ 9. Will hose hookups be required? Cold only, or hot and cold water?
___ 10. What are the dimensions of washing and sterilizing equipment?
___ 11. How will racks and cages be cleaned?
___ 12. Where will feed and bedding be stored?
___ 13. Where will dead animals be stored?
___ 14. Will animals be shipped from this facility? Where will they be prepared?
___ 15. Will an intercom system be required?
___ 16. Are animal rooms to be positive or negative in relationship to surrounding rooms.
___ 17. What are temperature and humidity requirements?
___ 18. Is space required for specialized equipment (e.g. x-ray generator)?
___ 19. What kind of lighting is required?
___ 20. Are timers required for lighting?
___ 21. What Animal Biosafety Level will be required? Consult with SEPP or refer to most recent edition of the DHHS publication entitled Biosafety in Microbiological and Biomedical Laboratories.
___ 22. Will there be a need for necropsy or special purposes hood.

CGMP FACILITIES

CGMP facilities are designed in accordance with the most recent addition of "NIH Design Policy and Guidelines" and FDA "Good Manufacturing Practices: 21CFR211".

___ 1. What is area to be used for? _____
A. Type of equipment _____
___ 2. Are there any temperature/humidity requirements? _____
___ 3. Classification of area? _____
Class 1000
Class 10,000
Class 100,000
___ 4. Lab pressurization requirements _____
___ 5. Are there any minimum access requirements? _____
For movement of equipment? _____
___ 6. Are there any special finishes required? _____
Ceiling? _____
Walls? _____
Floors? _____
Communications requirements
Intercoms _____
Telephone _____
LAN _____
___ 7. Is a door interlock system required?_____
___ 8. What equipment requires alarming? _____
___ 9. Are there any requirements for:
Hoods _____
Glove Boxes _____
Pass thru boxes _____
___ 10. Any special lighting requirements? _____
___ 11. Are there requirements for a sink? _____
___ 12. Utility requirements
Electrical
___ 120 volt
___ 220 volt/1 phase
___ 230 volt/3 phase
___ 460 volt/3 phase
___ Emergency Power
Mechanical
___ Domestic cold water
___ Domestic hot water
___ RO water
___ WFI
___ Plant Steam
___ Clean Steam
___ Vacuum
___ Gases
___ 13. Are redundant systems required? _____
___ 14. Are there requirements for use of flammable liquids in area?_____
___ 15. Are there requirements for dedicated gowning area?_____
___ 16. Are there requirements for room isolation for decon?_____
___ 17. Are there any temperature/humidity requirements?_____

CONTROL AND ALARMING

1. Animal Facilities

Animal Rooms -
- Temperature Control
- Humidity Control
- Static Pressure Control
- Temperature Alarm and Monitoring
- Humidity Alarm and Monitoring
- Static Pressure Alarm and Monitoring
- Animal Room Watering Systems Alarming
- Light Control Start/Stop
- Light Monitoring

Air Handling Units -
- Fan Start/Stop
- Fan VSD Control
- Temperature Control
- Humidity Control
- Static Pressure Control
- Temperature Alarm and Monitoring
- Humidity Alarm and Monitoring
- Static Pressure Alarm and Monitoring
- Freeze Stat Alarm
- Smoke Detector Alarm
- Freeze Protection
- Filter Alarming
- Flood Alarm

Exhaust Fan -
- Fan Start/Stop
- Fan VSD Control
- Fan Status/Alarm

2. Laboratory Facilities - BL-1, BL-2, BL-3 and All Others

All Labs -
- Temperature Control
- Static Pressure Control
- Temperature Alarm and Monitoring
- Humidity Alarm and Monitoring
- Static Pressure Alarm and Monitoring

Air Handling Units -
- Fan Start/Stop
- Fan VSD Control
- Fan Status/Alarm
- Temperature Control
- Humidity Control
- Static Pressure Control
- Temperature Alarm and Monitoring
- Humidity Alarm and Monitoring
- Static Pressure Alarm and Monitoring
- Freeze Stat Alarm
- Smoke Detector Alarm
- Freeze Protection
- Filter Alarming
- Flood Alarm

Exhaust Fan -
- Fan Start/Stop
- Fan VSD Control
- Fan Status/Alarm

3. Building Utilities

Chillers - Start/Stop Sequencing
Operating Status
Chilled Water Supply Temperature Alarming/Monitoring
Chiller Pump Start/Stop
Chiller Pump Status/Alarm
Main Building Pump Start/Stop
Main Building Pump Status/Alarm
Emergency Shut down for chillers
Refrigerant Monitor Alarming
Flood Alarm

Cooling Towers - Cooling Tower Temperature Control
Cooling Tower Temperature Alarm
Cooling Tower Fan Start/Stop
Cooling Tower Fan Status/Alarm
Cooling Tower Freeze Protection

Run Around Systems - Pump Start/Stop
Pump Alarming/Monitoring
Temperature Control
Temperature Alarming/Monitoring

Hot Water Pumps - Start/Stop
Status/Alarm
System Temperature Alarming/Monitoring

Hot Water Converters - Temperature Control
Temperature Alarming/Monitoring
Pump Start/Stop
Pump Alarming/Monitoring

Steam Stations - Pressure Alarm/Monitoring
High/Medium/Low

Instrument Air - Pressure Alarm/Monitoring
Domestic Hot Water - Temperature Alarm/Monitoring
Building Air Pressure - Pressure Alarm/Monitoring
Vacuum - Vacuum Alarm/Monitoring
Building CO2 - Pressure Alarm/Monitoring
Rodi Water Systems - Status/Alarm
Whole Building Water Filter systems - Status/Alarm

Monitor Building Equipment and Utilities with analog inputs where items are analog, digital inputs on contact closures, including but not limited to the following:

CO2 Pressure
Lab Air Pressure
Instrument Air Pressure
Vacuum
Hi and Low Steam Pressure
Domestic Hot Water Temperature and Pump
Contacts on the RODI Water System

Monitor the Oxygen Detector System
Flood Alarms in Attic and Utility Rooms

4.___ Scientific Equipment

Incubators -	Temperature Alarming/Monitoring
Freezers -	Temperature Alarming/Monitoring
Refrigerants -	Temperature Alarming/Monitoring
LN2 Freezers -	Status/Alarm
Walk-in Cold Rooms -	Temperature Alarming/Monitoring
	Supervised Panic Alarm with Local Audio-Visual Alarm
Walk-in Incubators -	Temperature Alarming/Monitoring
	Supervised Panic Alarm with Local Audio-Visual Alarm

5.___ Cardkey (Check with Peter Boving for requirements)

Doors-	In/Out Reader control - alarming
Utility doors-	In/Out Reader control – alarming

EQUIPMENT LIST **Attachment A**

Project _____ Prepared By :_____ Date :_____

Building: _____ Lab/Office: _____ Contact Person: _____ Phone Number: _____ No. of people & Computers in Lab/Office: _____

NOTE - Attach catalog cuts/specification sheets for each item to be installed in lab or office

Qty.	Mfg. Vendor & Vendor's Phone No.	Model/ Cat. #	Description	Dim. (LxWxH)	NIH #	Table/ Floor Mount	Power	Plug Type	Sci. Alarm/LAN	Ventilation Requirement	Lab Gases?	Water	Move From	Move To	Notes *weight, heat load, temp., humidity, gases, etc.*